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AMERICAN GAS LIGHT JOURNAL

FIFTY-EIGHTH YEAR

VOLUME CV., No. 14. Whole No. 3056. | NEW YORK, MONDAY, OCTOBER 2, 1916. | Subscription, $3 Per Year. $4 Canada. $5 Foreign.

The "PERFECT" Gate Box

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S. E. T. VALVE AND HYDRANT CO.

50 CHURCH STREET, NEW YORK

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KOPPERS

BY-PRODUCT COKE AND GAS OVENS

The most efficient method of carbonizing coal is in KOPPERS OVENS and the best coke and by-products are produced by this process.

H. KOPPERS COMPANY

Pittsburgh, Pa.

Builders of

By-Product Coke and Gas Plants
Tar Distilling Plants
Ammonia Recovery Plants
Benzol Recovery Plants

1859 FIFTY-EIGHTH YEAR 1916

AMERICAN

GAS LIGHT JOURNAL

VOL. CV., No. 14. NEW YORK, OCTOBER 2, 1916 WHOLE No. 3,055.

Remington Arms Company's Gas-Fired Annealing Furnaces for Rifle Parts Handle 20-Ton Charges

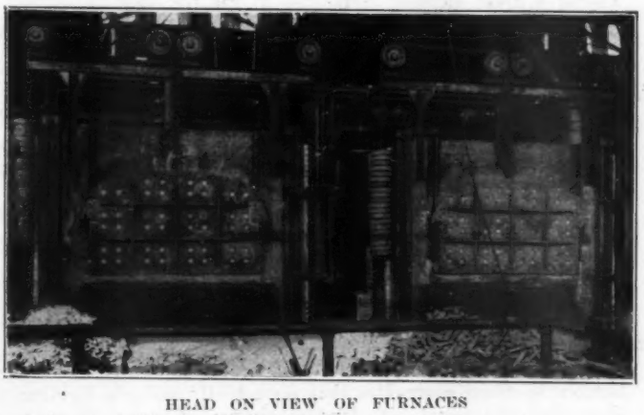
Outside Dimensions of Each Furnace are 20 Ft. Long, by 12 Ft. Wide, by 9 Ft. High—During Heating Up Period, Each Consumes 10,000 Cu. Ft. of Gas Per Hour—This Drops to About 5,000 Cu. Ft. Per Hour When Temperature is Reached

If the gas-fired annealing furnaces, installed at the Eddystone, Pa., plant of the Remington Arms Company for annealing rifle parts, should be run full for 24 hours per day, 300 days a year, they would consume between 60,000,000 and 70,000,000 cu. ft. of gas per year. During the heating up period each furnace consumes about 10,000 cu. ft. of gas per hour. This drops to about 5,000 cu. ft. when the temperature has been reached. For a maximum weight charge, approximately 72,000 cu. ft. of gas is used by each furnace.

The installation consists of two furnaces of the car-bottom type. The charge to each furnace varies from 20,000 to 40,000 lb. The furnaces are fired by the Surface Combustion system, which is capable of accurate control from a central control pulpit. Five hundred and eighty British thermal unit gas, at 43 cents per thousand cubic feet, is used in the work.

Flat Car With Fire Brick Top Serves As Bottom of Furnace

A flat car with a fire brick top serves as the bottom of the furnaces when in place. This car affects a seal with the furnace



HEAD ON VIEW OF FURNACES

walls by means of a sand seal. Two cars are used in each furnace, meeting at the center. Each of the furnaces has two doors, which, when closed, rest on top of the cars, the cars themselves extending out beyond the furnace walls about 6 in., and riding on rails which run completely through each furnace, and extend about 20 ft. beyond in both directions. The cars are handled by winches, and the doors are operated by air hoists.

The furnaces themselves are of the heavy rail buckstave type with red brick outside. The fire brick lining is backed up by cork brick insulation. Heavy tie rods tie the buck staves both across and end to end.

TO KEEP COLD DRAUGHT FROM CIRCULATING UNDER CARS METAL SHIELDS ARE PLACED OVER OPENING AT BOTTOM

To prevent cold air from leaking in, thus giving an oxidizing atmosphere and lowering the furnace efficiency, a furnace back pressure is carried, the flue openings being adjusted to a size to get this condition.

As in all work of the Surface Combustion type, the furnaces are designed to develop and utilize the maximum possible amount of radiant heat. The flues are arranged so as to distribute the hot gases uniformly, and to release them at the lowest possible temperature. Each furnace is equipped with 20 surface combustion high pressure burners.

Control from Central Pulpit

Both furnaces are controlled from a central control point by a single valve which regulates the pressure supply. By raising or lowering the pressure the gas supply is increased or decreased, thereby raising or lowering the temperature.

All pyrometer readings are also taken at this point from a multiple point indicating instrument. Four couples are located in each furnace, one in the center of each side of each car. A very small amount of a man's time is required to hold the furnaces to the exact temperature called for. The temperature control is very accurate, and a given temperature can be held within a few degrees.

The furnace temperature can be varied at will. Readings on an Orsat apparatus have shown that oxygen equals 0.0. Carbon monoxide also equals 0.0, and there is an average of 15.2 carbon dioxide. This indicates that the heat can be generated with a 100 per cent efficiency, having no excess air and no unburned gases.

When the furnaces were first put into operation, it was planned

to pack the rifle parts in large steel boxes, with covers sealed with clay. This was to prevent oxidization.

Believing that a reducing atmosphere could be absolutely maintained, which would produce a minimum of scale, a trial was made, of simply stacking the parts uncovered on the car top. This resulted successfully, and the operation has since been handled in this manner.

To maintain this reducing atmosphere, the pressure is adjusted to give a flue gas reading of about 1.2 carbon monoxide.

A One Pipe System

The Surface Combustion High Pressure System, by which the furnaces are fired, is a process whereby gas under pressure is made to inspirate all the air necessary for complete combustion, maintaining automatically constant mixture proportions, and eliminating all motors, blowers and air piping. It is a one pipe system. Five hundred and eighty British thermal unit gas (a mixture of water and coal gas) supplied by the Philadelphia Suburban Gas & Electric Company, of Chester, Pa., is used for the work. This is delivered and metered under a pressure of 25 lb.

The efficiency of the furnaces varies, of course, with the weight of charge, an average being about 15 per cent, which in an annealing operation is considered a rather remarkable figure. During the heating period each furnace consumes about 10,000 cu. ft. of gas per hour. When temperature has been reached, this is dropped to about 5,000 cu. ft. per hour. For a maximum weight charge approximately 72,000 cu. ft. of gas is used by each furnace. Two charges per furnace can be secured per 24 hr. day. Running both furnaces full for 24 hours per day, 300 days a year, would mean a consumption of between 60,000,000 and 70,000,000 cu. ft. per hour. This yearly consumption will naturally vary with the weight of charges and the regularity of operation of furnaces.

The gas is bought on a sliding scale rate, and costs approximately 43 cents per thousand cubic feet for this work. The temperature of the anneal is 1550 deg. Fahr.

Time of Operation

The charge is first placed in the cold furnace, then the fuel is turned on full until the furnace has reached the correct temperature.

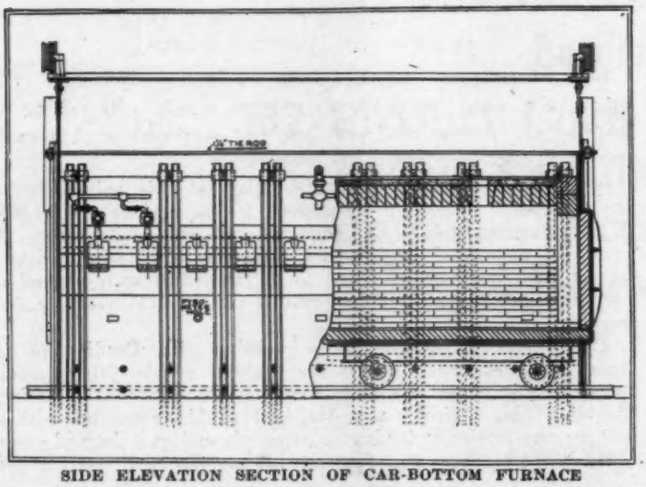
The time it takes to reach temperature varies with the weight of the charge. For a 40,000 lb. charge, it takes about five hours.

After the temperature has been reached, it is held for four hours to allow the heat to soak into the work. After this, the fuel is turned off and the furnace allowed to cool slowly, the work not being taken out until a temperature of 400 deg. or 500 deg. Fahr. has been reached.

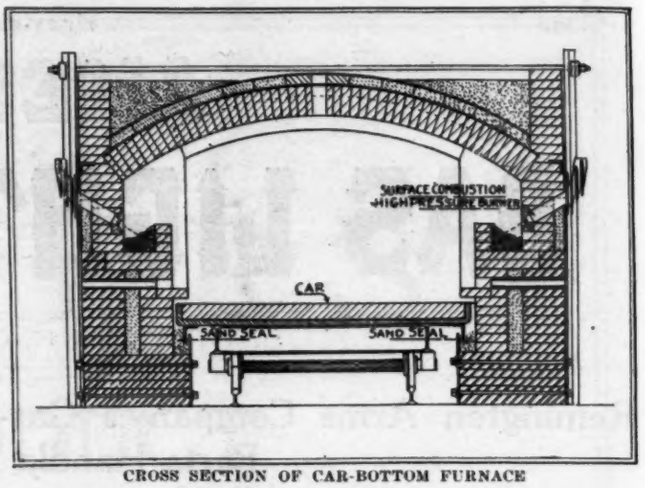
The furnaces were installed in the face of competition of fuel oil costing 4½ cents per gallon. Several oil-fired furnaces of approximately the same size and doing the same work were in operation prior to the installation of the gas furnaces. One of these oil-fired furnaces was carefully tested for a period of several days, the oil being measured in a calibrated tank.

Subsequent tests of gas fired furnaces have proven conclusively that the operating cost of this outfit is very considerably lower than that of oil.

The furnaces were engineered, designed and installed by the Surface Combustion Company of New York City.



SIDE ELEVATION SECTION OF CAR-BOTTOM FURNACE



CROSS SECTION OF CAR-BOTTOM FURNACE

In Use of Gas for Lighting Pacific Coast Lags Behind Older Communities

In the use of gas for lighting the Pacific Coast, and particularly California, lags far behind the older communities in the East and Middle West, stated F. S. Wade in a paper presented before the recent annual convention of the Pacific Coast Gas Association, held at Santa Barbara, Cal. This regrettable condition has been brought about largely through the policy pursued by combination companies of sacrificing gas lighting in favor of electrical. There are now, fortunately, signs that even combination companies are awakening to the fact that the energetic pushing of gas for lighting does not injure the electric lighting business but actually, through raising the standard of illumination in a given community, tends, under equable rate conditions, to increase the sale of electricity.

The high quality of gas light for both domestic and commercial uses cannot be denied. Gas lights are now being made which compare favorably in decorative features with the best efforts of our competitors. Through the improvement of pilot lighting devices and bunsen burners the disadvantages of gas in point of convenience have been largely overcome. What then, stands in the way of a great increase in the use of gas for lighting?

First and above all lack of enthusiasm on the part of the gas men of the Coast for lighting.

They are afraid that it does not pay; that the cost of maintenance is too high; that they will not hold the business, and so on.

The fact is gas lighting on a monthly maintenance basis does most distinctly pay and pay well.

The very fact that all gas used for lighting is taken from the system when practically all the other business is off is of tremendous advantage to the company.

The average load factor of gas companies on the Coast does not exceed 35 per cent. It is self evident that the sale of gas, at times which improve the load factor, is exceedingly profitable to any company.

It requires only a casual study of figures on the cost of maintenance to those companies that do actually sell gas lighting to show that the usual maintenance charge of about 10 cents a mantle a month covers all costs and even pays interest on the capital investment.

Next to our own mental attitude on gas lighting, our greatest disadvantage is the lack of interior piping to supply gas lights. It is one thing to induce a man whose house or store is piped, to put in gas lights; and quite another when pipes are not in and walls must be torn open to put them in.

If we expect to increase the use of gas for lighting we must work vigorously on a campaign of education to induce architects and builders to provide gas as well as electric outlets in every room. When we have accomplished this our fight for gas lighting is more than half won.

PERFECTED DEVICE CONSISTS OF SINGLE TRESTLE SUPPORTING WINDLASS PIPE

Windlass Arrangement Takes Place of Tripod and 4-Legged Derricks on San Francisco Distribution Work

Consists of Windlass Pipe Turning on Wooden Bearings By Means of Common Pipe Tongs Operated By One Man at One End of Pipe While at Other End a Ratchet Takes Care of Any Reverse Motion in the Pipe—Great Economy Effected by Improved Laying Appliance

D. E. Keppelmann, general superintendent of the gas distribution department of the Pacific Gas & Electric Company, in a paper presented at the recent annual convention of the Pacific Coast Gas Association, described a pipe laying appliance which has taken the place of the three and four-legged derricks for pipes up to 16 in. in diameter, and which has effected considerable economies in such work, as follows:

CONSISTS OF WINDLASS ARRANGEMENT ON WOODEN TRESTLE

It consists of a wooden trestle, supporting a windlass pipe turning on wooden bearings by means of a common pipe chain tongs and operated by one man at one end of the pipe, while at the other end, a ratchet is screwed to the pipe and fastened to one leg of the trestle. The ratchet takes care of any reverse motion in the pipe.

The fitting or pipe to be lowered is rolled or skidded in the usual manner over the trench, a rope, varying in size with the weight to be handled is fastened to it and the free end is wrapped four times around the transverse pipe, acting as a windlass.

One man handles the chain tongs and another man takes in the slack of rope, while the ratchet, automatically, takes care of any slip on the part of either men.

When the skids are cleared, they are removed, and the fitting lowered in place by the one man easing up on the rope. This should be done carefully, so as to avoid surges that might break the rope.

In the case of pipe of any diameter so far used (up to 16 in. cast iron), the rope is fastened a little to one side of the center toward the bells, and, on being lowered, the spigot end is depressed in order to clear any dirt or rock that may have lodged in the pipe.

RATCHET WAS MADE IN COMPANY'S SHOPS

Some years ago, the same sort of unwieldy appliance was used as is generally employed on such work, *viz.*, the 3 or 4-leg derrick with windlass, requiring from 6 to 8 men to handle.

The saving in costs with the new device has been tremendous, sufficiently so as to entirely eliminate the old three legged derrick.

The first step in the improving upon these was a double house mover's crib on which rested the pipe (4 in.) used as a windlass. In this case the manipulation was done by hand, that is, men with chain tongs hoisting and holding back.

This was improved upon by using the ratchet, made in the company's shop, which did away at once with one and sometimes two men.

IN ORIGINAL MACHINE WINDLASS PIPE WAS SUPPORTED ON TWO TRESTLES

MAXIMUM WEIGHT HANDLED WAS 1,790-LB. FITTING

Finally, the present rig was evolved, composed of a maximum weight trestle and ratchet; the whole outfit extremely flexible, strong, and adaptable to any conditions that the company has had to meet to date.

The maximum weight handled so far is a 1,790-lb. fitting for a 16-in. line. This was manipulated, lowered in place, etc., by six helpers and one fitter, using a 1¼-in. manila rope.

Duct System Effects 10 Per Cent Economy in English Factory High Pressure Gas Lighting Installation

Indrawal of Dust by Burners Eliminated by Running Special Duct Through Building to Convey Fresh Air from the Outside and Coupling Up High Pressure Gas at Various Points Throughout its Length

The presence of a considerable quantity of dust and other particles in the atmosphere at many factories, which, through their indrawal by the burners, are the contrary of beneficial to the maintenance of the efficiency of high-pressure lamps, has been, in such places, to the advantage of electric lighting, asserts the London *Journal of Gas Lighting & Water Supply*, in commenting on a recently devised system, which, as has been demonstrated by an actual installation, eliminates this objection, and has resulted in a considerable economy of gas—10 per cent—and, dusty atmosphere notwithstanding, the efficiency of the lighting has been upheld, although small units are employed.

The new method of installation is known as the "Duct" system. A special duct is run through the building, conveying fresh air from the outside. The high-pressure gas is coupled-up at various points in the length of the duct, and each of the connections supplies, by means of one injector, a number of high-pressure burners—four, six, or eight as the case may be.

The injector is of large capacity, and is therefore not liable to choke. It draws in the correct quantity of fresh air from the duct, and the mixture of gas and air is forced along a pipe ¾ in. to 1 in. in diameter, to which the burners are attached in the required positions.

It is seen from this that the air supply for the burners is quite independent of the dust-laden atmosphere of the factory, and that the use of a single injector for the supply of a number of burners connected up with the tube containing the mixture, will enable the use of units smaller than 75 to 80 candle power, which with Edinburgh gas is realized, under the "Duct" system, from a consumption per burner of 1½ cu. ft. per hour.

A Million Tons of Nitrogen Could Have Been Obtained from Bituminous Coal Mined in Country Last Year

A million tons of nitrogen could have been obtained by proper treatment, from the bituminous coal mined in the United States last year. At an estimated requirement of 40,000 tons of nitrogen in the form of 180,000 tons of nitric acid this would be enough for a twenty years' war. Methods of recovering coal nitrogen as ammonia and then converting it into nitric acid, states the *Journal of Electricity, Power and Gas*, have been sadly neglected in this country.

Flood Lighting By Gas Gives Most Satisfactory Lighting Effect

C. B. Babcock Describes Installation of Portland, Ore., Gas & Coke Company—Spacing of Posts Worked Out with View to Getting as Near as Possible an Even Distribution of Light

Flood lighting has become generally accepted by the public as a distinct invention by electric interests, when as a matter of fact, flood lighting on a smaller scale was first practiced to the best of the speaker's knowledge, shortly after the gas arc lamp was first placed on the market, declared C. B. Babcock, in a paper presented at the annual convention of the Pacific Coast Gas Association, held at Santa Barbara, Cal., Sept. 19-22.

With the advent of the upright type of outdoor gas arc lamp, there was a demand for window lighting from outside sources, and the General Gas Light Company conceived the idea of the use of a parabolic reflector, and, with this equipment the gas lamp projected its light into the window, flooding the interior with light and also doing some service as an outdoor lighting advertisement.

When the inverted gas arc lamp was first placed on the market, the parabolic reflector was constructed to be used in conjunction with this lamp for certain installations, and has continually enjoyed considerable popularity.

The world at large first realized the wonderful value of flood lighting and beautiful effects to be obtained, when De Arcy Ryan, illuminating engineer in charge of lighting effects at the Panama-Pacific Exposition, first adopted this system of lighting on a large scale, and which proved so successful in bringing out the wealth of detail and artistic beauty of the magnificent buildings on the Exposition Grounds.

Shortly after the close of the Exposition, the Pacific Gas & Electric Company constructed a new sub-station on Balboa Street, in San Francisco, and there installed concrete posts equipped with electric units and carrying out the flood lighting idea.

Gas Flood Lighting Practical

A few months ago the speaker was asked by the engineer of the Portland Gas & Coke Company, E. L. Hall, if it would be practical to utilize gas for flood lighting purposes at their new compressing station, and was informed that it was not only practical, but such an installation could be made and would make a most attractive and satisfactory lighting effect.

With slight improvements, the concrete electric flood lighting posts used by the Pacific Gas & Electric Company in San Francisco, have been adapted to the use of gas.

In order to adapt this post for the use of gas, it was necessary to enlarge the head and make other minor alterations.

The primary feature considered in selecting the proper lamp for the posts was to obtain the greatest quantity of light on the face of the building, and at the same time procure an even illumination, without shadows.

The general construction of the post head suggested the use of an upright burner and several standard types of these were tried out in addition to a special burner which was made up in

the laboratory. Relative tests were made between these and inverted lamps, and after due consideration, a No. 50 Humphrey outside arc was selected.

It was decided to use an opal globe and a clear shade with this arc. In order to utilize all of the available light, it was necessary to install a reflector on the inside of the post head, which at the same time would protect the head from the heat of the lamp.

Mirror Reflector Contemplated at Start

A mirror reflector was first contemplated, but inasmuch as this incurred considerable unnecessary expense, and, as it was thought this type would deteriorate in a short time, it was decided to use sheet metal. The reflectors in use were made of No. 26 gauge galvanized iron and are enameled with white "Vitrolite," which was baked on by a local concern.

The face of the building is 42 ft. in length, and 20 ft. in height. It was decided, chiefly for the sake of appearance, that the height to the center of the light should be 12 ft.

From the enameled surface of the spherical reflector it was determined that a diffused reflection would be obtained, and the general effect would be similar to the reflection from a flat diffused surface, only the light would be tangent to the surface, and thus have a more thorough distribution. The form of distribution of the light was not very different from that of the lamp itself, especially since practically one-half of the light was reflected.

Further tests with various reflectors showed that the angle between a horizontal line through the light and the top of the building must not be more than 30 deg., which results in placing the posts approximately 15 ft. from the building. The spacing of the posts along the front of the building was worked out with a view of getting as near as possible an even distribution of the light. The posts were 8 ft. from each end of the building and 26 ft. apart.

Construction Details

The posts and post heads are constructed of reinforced concrete, consisting of one part white Madusa cement and two parts white shell rock beach sand. The reinforcing is of steel channel iron and heavy iron wire, and also a 2-in. diameter wrought iron pipe, which extends from the bottom of the foundation to the head.

In constructing, the outer shell of the posts was cast at the moulders works, and at erection, the 2-in. pipe was raised, then, as each section of the columns was placed, the space between the section and the pipe was filled with plain concrete.

The 2-in. pipe was not only installed to reinforce the post, but also act as a drain for the head and the lower basin, and also to receive a ¾-in. diameter pipe, which supplies gas for the lamps.

The lamp posts were constructed at a cost of $200, the reflectors at $28, and the foundations and other erecting expense was $50, making a total of $278 or a unit cost of $139.

This is the first time in the history of the gas industry that an installation on a large scale of gas flood lighting has ever been attempted, and surely opens up a wide field for this kind of lighting.

Many Exhibits at National Exposition of Chemical Industries of Interest to Gas Men

The National Exposition of Chemical Industries was held in the Grand Central Palace, New York, Sept. 25-30.

While the many exhibits were largely of a technical nature, on account of the wide discussion in the daily press regarding the dye and color situation in the United States, unusual interest was shown by the general public as the exhibition rooms were overflowing afternoon and evening. There were over 200 exhibitors, many of which had live exhibits, and all of which were interesting and instructive.

The following exhibits of special interest to gas men were on display:

The United Gas Improvement Company of Philadelphia, showed features of its residual department. All the by-products which an artificial gas plant could make were shown, and it was a revelation to the layman who had always thought that a gas company only manufactured gas.

The H. Koppers Company, of Pittsburgh, builders of by-product coke and gas ovens, also The Koppers Direct Process for the manufacture of ammonium sulphate, ammonia recovering and concentrating apparatus, showed a miniature plant, and all of the products produced from it.

The Brown Instrument Company of Philadelphia, Pa., had a large exhibit of all kinds of heat-recording instruments. They have just issued a new instructing catalog which they will be glad to send to any gas man on request.

The DuPont Chemical Works, Equitable Building, New York, showed a complete line of its chemicals and mixtures for industrial, medicinal and laboratory uses.

The Bristol Company, of Waterbury, Conn., showed a complete line of heat recording instruments.

The Scientific Materials Company, of Pittsburgh, Pa., had on display a line of hardness testing machines.

The Prest-O-Lite Company, of Indianapolis, Ind., showed a complete welding apparatus.

The U. S. Cast Iron Pipe & Foundry Company, displayed samples of pipe, and issued a catalog giving standard specifications for cast-iron pipe and special castings.

The Life Saving Devices Company, of Chicago, Ill., exhibited several styles of life saving devices.

The Nash Engineering Company, of South Norwalk, Conn., showed an active exhibit of Nash hydro turbine air pressure and vacuum pumps.

The Schaeffer & Budenberg Company, of Brooklyn, N. Y., exhibited a complete line of recording instruments.

The Beach-Russ Company of New York, exhibited a line of positive pressure boilers and rotary air compressors.

The Kieselguhr Company of America, had an active exhibit showing the heat resistance qualities of sil-o-cel insulating brick, powder and cement, also celite and light weight mineral filler.

The Foxboro Company, Inc., Foxboro, Mass., had a complete exhibit of recording instruments, and the Pittsburgh Testing Laboratory, of Pittsburgh, was represented by a display.

Effective Advertisement of Gas for Heating

The Boston Consolidated Gas Company is utilizing a liberal amount of space in some of the Boston newspapers to point out the advantages of gas for heating, especially as cool weather comes on, and heat is needed to take the chill off the atmosphere of the house. Modern heaters, it says, are attractive in design, and odorless. The Boston company carries reflector and cone heaters, gas logs and gas-steam radiators.

GAS *for* HEATING

Quick Heat

In the Fall of the year when you want heat you want it quick. It doesn't pay to wait for the coal furnace to get up heat, because by the time it comes you no longer need it and any further heat is only a nuisance. You all know how uncomfortable it is to sit around in an overheated house in the Fall of the year and how easy it is to catch cold under such conditions.

The remedy is the use of gas for heating in the Fall and Spring. Heat comes at once, as soon as the gas burner is lighted, continues as long as needed, and ceases when extinguished. What could be more ideal?

Attractive Designs

If you have not seen the modern gas heaters, do not fail to call and examine them. The new designs are very attractive and odorless. We have reflector heaters, cone heaters, gas logs, gas steam radiators, etc.

Variety of Types

A very pleasant combination is to have a reflector heater in the bedroom or dressing room connected to permanent concealed piping, another in the bathroom, and a gas log in the breakfast room. You will find it will be very nice to start up the gas log during breakfast or at other short intervals when you would not be likely to use a wood fire at all, on account of the dirt and trouble of looking after it for such a short time. A heater in the nursery is also very convenient.

Save Coal

The gas steam radiator is very useful when heat is required for longer periods. It is a little steam heating plant in itself, and the gas is turned down automatically by the steam pressure so as to make it very economical. It is also largely used in stores and offices.

Don't put off your purchase until the cold snap comes, but be prepared.

COAL IS GOING TO BE VERY EXPENSIVE THIS WINTER. SAVE IT BY USING GAS THIS FALL

Ask also about our Garage Heaters

USE GAS THE MODERN FUEL

Boston Consolidated Gas Co.

16-24 West St. Telephone Oxford 7060

BOSTON COMPANY POINTS OUT ADVANTAGES OF HEATING WITH GAS

AMERICAN
GAS LIGHT JOURNAL

FIFTY-EIGHTH YEAR.

Published Weekly by
AMERICAN GAS LIGHT JOURNAL, INC.
42 Pine Street, New York, N. Y.

ELBERT P. CALLENDER, President
STANTON G. KRAKE, Vice-President.
FREDERICK A. SOUTHWORTH, Treasurer.
CHARLES H. WADELTON, Secretary and Manager.

EUGENE C. MILES, Editor

Subscription, $3.00 per year, including postage in the United States, Mexico, Cuba, Porto Rico, Hawaii or the Philippines.
In Canada, $4.00. Foreign, $5.00.

Entered at the Post Office, New York City, as Second Class Matter.

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Following the Trend of the Times in Association Papers

In the subjects dealt with, and in the manner in which they are treated, the papers presented at recent association conventions —that of the Michigan Gas Association, at Detroit, and that of the Pacific Coast Gas Association, at Santa Barbara, Cal.,—emphasize most clearly that our associations are following closely the trend of the times in the gas industry, and are factors of real value to the rapid development of this industry.

During recent months the gas industry, and the gas man in this country have been subjected to volumes of adverse criticism, mainly destructive—not constructive in nature. If we were to believe half of what has been printed, we must of necessity believe that the gas man, since time immemorial, has been of an exceedingly low caliber type of mankind, and wonder how such men could have built up the splendid industry that is now devoted to utilizing to the most minute degree, the products of the carbonization of coal.

That this wave of criticism is not entirely confined to this country, but that, on the contrary, the spirit is contagious, is manifested by the fact that in England, as evinced editorially in the *Journal of Gas Lighting & Water Supply,* they are engaged in a similar controversy.

Even the most critical, after a careful study of the papers presented at the two conventions cited, cannot truthfully assert that those who attended the meetings, and those who have read the published abstracts of these papers did not receive a real benefit from so doing. Almost invariably they were of the useful type; the kind which plant the germs of valuable thought in the minds of men, and give them real assistance in solving their problems.

Extremists assert that the real need, and the whole need, of the gas industry to-day is the development of the selling end. This journal cannot concur with this view. While fully cognizant of the vast importance of adopting the most modern and alert methods of salesmanship, of combating the arguments of our competitors and giving gas the most widespread publicity it has ever known, this journal does not believe that the last word has been said in the matter of manufacture.

The commercial end undoubtedly represents the most pressing need. Unquestionably we have attained a greater efficiency in manufacture than in selling, but, nevertheless, the former is still a vital factor and one we cannot afford to neglect.

The engineer, to-day, to as great an extent as ever, retains his relative degree of importance to the industry as compared to the salesman.

Both ends were fully covered in the papers presented at these conventions. Neither was neglected to the advantage of the other. And all the subjects dealt with were of a kind that should be vitally useful to those who heard or read.

Incidentally the associations have proved that they are keeping up with the trend of the times; that they are of real service and value to their members and to the industry as a whole.

Concerning Cost Data

An extremely valuable paper, among those presented at the recent annual convention of the Pacific Coast Gas Association, was that of D. E. Keppelmann on "Facts and Figures in Gas Distribution," an abstract of a part of which is published elsewhere in this issue. As Mr Keppelmann states, such data as these are seldom published,—though why this should be in the gas field we cannot understand—and the gas man often has had to make use of such data as he could find published in other fields, in making up estimates of the cost of contemplated works. Such data is quite frequently worse than useless, much of it having been "fudged" and adjusted for certain specific reasons best known to the one who has given it out.

Mr. Keppelmann's data therefore fills a long felt need. The basic facts upon which the cost data in the waterworks field, for instance, are founded are generally furnished by contractors who are in constant competition with each other. It is not in accord with human nature that John Jones should furnish James Smith with the information upon which he can base an estimate to underbid him at a competitive letting.

But it may be that John Jones has a fondness for seeing his name in print, and he is aware of the fact that cost data are eagerly sought for publication.

In which case he may suddenly grow remarkably frank and reveal a great deal of information in regard to his costs of doing work, but it can be relied upon that his figures will be high. If anyone knew just how high, the data would still be of value, but in such matters John Jones is generally quite inconsistent.

Or, again, it might be that John Jones considers that there are too many contractors in the field. Breaking a competitor, if one's conscience is sufficiently flexible, is a good means of eliminating him, and John Jones can be certain that, even in the contracting field, there are sufficient fools to grasp as the most obvious bait offered. Consequently cost data are sometimes presented that are ruinously and falsely low.

Manifestly there can be no temptation to a gas company to mislead other companies as to its costs of doing work. It may be, however, that a temptation can exist to maintain a complete silence on the subject. High costs do not necessarily imply poor management, —most frequently they are due to local conditions—but many managements may think they do, and for this reason prefer to keep their costs private, even when they are creditably low.

A knowledge of what it costs other companies to do certain work is an incentive to doing better work oneself. The desire to equal or surpass one's fellows in any line of endeavor is still a strong impulse within all of us. For this reason the frank revelations in regard to the main-laying costs of the Pacific Gas & Electric Company, which Mr. Keppelmann has made, cannot fail to serve a most useful purpose, and reflect great credit on the policy of the company which has permitted them to be made public.

The great danger in using published cost data is in failing to take into consideration the various factors entering into its determination. Mr. Keppelmann has recognized this danger in the preparation of his paper, and has included those minute details, which constitute the greatest value of any cost data, and, at the same time, generally make it exceedingly dry reading.

The Master Gas Man

There are men, to-day, who will tell you that they would not advise a young man to enter the gas business. They are pessimistic in regard to the future. They seem to feel that no opportunities are left in the business.

There are, however, men who constantly boost the industry. There are men who are constantly defending it and fighting for it. These men are optimists. What they write and say is like sunshine after rain. Unfortunately this type is not as numerous in proportion as it should be. These men are master gas men. They make the industry progress. They are the men without whom failure is imminent.

It is bad for any industry to have its members plead poverty and talk of hard times. If this is done for a long enough period, there *will be* poverty and hard times in that industry because the best men will not enter it. High grade men and funereal atmospheres never mix.

A few years ago there were published many articles from the pen of a master gas man. It gave one new energy and new hope to read them. Never was there a taint of pessimism in even a single paragraph. They were as thoroughly permeated with sunshine as is the clime in which they were written. Such is the spirit that we need in the industry. Gloom and pessimism court failure. Cheerfulness and optimism breed success. The optimistic man, the man who is never overwhelmed with discouragements, is the master man.

The gas industry has existed for over a hundred years. It has had over a billion dollars invested in its plants, office buildings, distribution systems, etc.

Why should the men who are making a living out of it, especially those who are holding high positions, put on long faces and talk hard times, simply because a stripling industry only thirty-four years old threatens to offer a little competition?

Why should these men conduct themselves in such a way as to cause the ambitious young men to enter the electric industry rather than the gas industry?

Surely there is no reason why they should do so. If there are any who think there is, they are making a very serious mistake. We cannot afford to allow the impression to prevail that the industry has become so old and indolent that it can no longer make strenuous and effective efforts to advance.

The master gas men tell us there is far more promise in the future than there has ever been in the past. They never talk about the good old times. They talk about the great things to be accomplished. These man may grow old in years, but they always remain young in spirit, and in thought. They are the men who do things, men who accomplish things, who adopt new ideas, and encourage all other men to do original constructive thinking and to adopt the newest ideas. When such men control any industry we find rapid progress being made. It is with such men that young men like to work. It is such men who influence the very best young men to enter an industry.

If the gas business is to make the greatest possible progress, every man in the industry should strive to become a master gas man. Every man should remove the shroud of gloom and unwarranted pessimism, and replace it with a mantle of sunshine and good cheer. Surely one need not be dubious as to the future of business that has existed and prospered for a full century, and at the end of that period, stands on the threshold of a period of its greatest expansion.

Incinerators and Infantile Paralysis

During the past six months the country has experienced one of the worst epidemics of infantile paralysis in its history. Health authorities agree that the fly is one of the most effective carriers of disease we have. There is every reason to believe that he has done his part in spreading this dread plague that has crippled and killed so many young children this past summer.

The epidemic, however, has given gas companies an opportunity to show their interest in the welfare of the town and at the same time increase their revenues. Where gas fired incinerators are used, flies cannot breed anywhere near as rapidly as where the garbage can is used. If every one used incinerators there would be fewer flies, fewer germs would be carried from family to family, and there would be less sickness.

There are many ways and many times when a keen interest taken in the community it serves will result in financial benefit to the gas company. This is only one of them. Has every gas company done its part in helping along fly campaigns and in the work of fly prevention by running incinerator campaigns? Every summer many diseases are communicated from child to child through the medium of the fly. The epidemic that ran rampant this past summer was more spectacular than the others. Possibly, however, over a period of a quarter of a century it will not claim as many small victims as some less widely advertised disease.

It is not only good business for every gas company to push the sale of incinerators as fly preventors, but each company owes it to the cause of humanity to push them. There is possibly no way to tell just how many fewer deaths there would have been among children this past summer if every garbage can had been eliminated and replaced by a gas fired incinerator. It is evident, however, that there would have been a goodly number less. The deaths would not only have been fewer but there would be far fewer cripples which will in the future have to be supported by the strong and healthy. In other words, an immense amount of human energy would have been conserved.

Here is a grand opportunity for the gas industry to work heart and soul in the cause of humanity. It can at the same time put more dollars into its pocket than it takes out. The summer is now past and what has been left undone is still undone. The opportunities that were lost last summer are gone forever. This, however, does not prevent gas men from preparing to do their very best with the coming of another summer season. Next year we hope there will not be another epidemic of the disease that wrought such destruction during the past summer. There will, however, be a large number of deaths due to the disease germs distributed by flies. The gas industry can do a great deal to reduce this number, and to add just so much to the happiness, healthfulness, and prosperity of mankind.

San Francisco's Hills Add Much to the Beauty of the City—Also to the Cost of Laying Pipe

D. E. Keppelmann, of the Pacific Gas & Electric Company Gives Cost Data on Distribution Work in that City—Describes Conditions Encountered and Details Factors which Have to be Considered

The most efficient weapon with which the man of business of the present day fights his battles, is his cost sheet, and this is true, not only of the individual but of the Corporation,—great or small, asserted D. E. Keppelmann, general superintendent of the gas distribution department of the Pacific Gas & Electric Company, of San Francisco, Cal., in his paper on "Facts and Figures in Gas Distribution," presented at the annual convention of the Pacific Coast Gas Association, held at Santa Barbara, Cal., Sept. 19-22. The cost sheet is used, not only for estimating purposes, but will almost at a glance, reveal the leaks—big and small—which must of necessity occur in any organization, however minute its care, however watchful its eyes.

While the costs as herein presented are in accordance with local conditions, nevertheless, they are applicable to any locality, by the substitution of such factors as the unit wage paid by the different companies, some difference on account of traffic conditions, and, possibly, some slight changes due to difference in cost of materials.

Management and organization are necessarily factors to be reckoned with, together with such details of methods employed.

All items, other than those immediately concerned with labor, are based on price and cost of material as of 1914; the present fluctuations in the cost of the lead, fittings, pipe, and other similar material is considered to be due to causes which will not permanently affect such prices, and, therefore, it was deemed expedient for the purpose of this paper to disregard any increase which can be but temporary.

In considering the items of labor cost, one intangible item is of the greatest importance, to wit: The climate. It has been proven beyond any doubt, that efficiency cannot be maintained under abnormal climatic conditions, of extreme heat, particularly. It can be proven, too, by actual tests, that efficiency of the individuals will vary from day to day with other unknown elements, such as health, surroundings, family life, food, etc., etc.

Conditions Under Which Work Was Done

The territory in which the work which is the basis of these data, was done, includes all of the city and county of San Francisco. The city occupies a peninsula whose area is roughly—fifty square miles. Within this area, the majority of streets are on a grade, and four per cent would be a fair average of all the grades in the city. Some of the streets are very much steeper—in fact, grades of twenty-five and thirty per cent are not uncommon, and add much to the beauty of the town, also to the cost of laying pipe.

As to the soil, it must be noted that a goodly percentage of the city (all of that portion situated along the harbor front) from the water front inland (an average of two thousand feet wide) is filled-in ground, making it possible for one of the foremen to report in all truth as follows:

"Nature of Soil—tin cans, lumber, brick-bats, scrap iron, etc." And, from this through sands and clays, to the toughest, solid rock. Every variety has been encountered.

We owe some of our efficiency to our climate. It is economical, because a man can work his full time without experiencing that tired feeling which comes from excessive heat, and he is not burdened with a surplus of clothes to keep him warm, as in colder climates. He needs no stimulants of any sort, hence, does not abuse his internal machine, which leaves him in fine condition at all times.

Low Pressure Main Cost Chart

The accompanying cost chart gives in detail, the cost of laying mains, obtained from field data and observations. It must be noted that the classification of SAND means sand or sandy soil, loams or other material which can be handled with a shovel, with little or no picking, and that ROCK must be understood to com-

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Cost of Laying 4-in. C. I. Pipe

Main	Depth	Width	Length
4-in.	2½ ft.	1⅔ ft.	100 ft.

$5/2 \times 5/3 \times 100 = 1250$

$\frac{1250}{3} = 416$ cu. ft.

$\frac{416}{150} = 2.77$ days @ $2.75 = 7.6175$ per 100 ft. of trench for trenching.

Caulker—$3.75 per day.
Helper —$2.75 per day.

$6.50 per 8 hrs.

$\frac{650}{8} = \$0.81$ per hour.

Ten joints per 100 ft. will take 2½ hours @ $0.81 per hour=$2.02.
Cost of caulking=$2.02.

Fitter —$3.75
Helper— 2.75
" 2.75
" 2.75

$12.00 for 8 hours=$1.50 per hour.
Will take 2½ hours to lay 100 ft. of 4-in.=$3.75—cost of laying.

Per Ft. (Sand)
$0.0761 Trenching
0.0202 Caulking
0.0375 Laying
0.0380 Backfilling

$0.1718 Total cost of 1 ft. of 4-in.

Per Ft. (Rock)
0.1760 Trenching
0.0202 Caulking
0.0375 Laying
0.0830 Backfilling

0.3167 Total cost of laying 1 ft. of 4-in.

Cost of Laying 6-in. C. I. Pipe

Main	Depth	Width	Length	
6-in.	3 ft.	1⅚ ft.	100 ft.	500 cu. ft. trench.

$\frac{550}{150} = 3.66$ days @ $2.75 = $10.065 trenching.

Will caulk 3 joints per hour.
Ten joints per 100 ft. will take 3½ hours @ $0.81 per hour=$2.70.

Caulker, $3.75 per day
Helper, 2.75 " "

$6.50 per 8 hours

$\frac{650}{8} = \$0.81$ per hour.

1 Fitter, $3.75
3 Helpers, 8.25

$12.00 for 8 hours=$1.50 per hour.
Will lay 3 lengths per hour.
Will take 2⅔ hours to lay 8½ lengths @ $1.50=$4.25—cost of laying.

Per Foot (Sand)
$0.10065 Trenching
0.05032 Backfilling
0.0270 Caulking
0.0425 Laying

$0.22047 Total cost of laying 1 ft. of 6 in.

$0.2526 Trenching
0.1163 Backfilling
0.0270 Caulking
0.0425 Laying
Per Foot (Rock)

0.4184 Total cost of laying 1 ft. of 6 in.

prise any material such as clay, true rock and other material not classified as sand.

This classification is adopted as being the simplest and most satisfactory, because it allows a good safety factor for the purpose of estimating.

Let us now consider the case of 6-in. cast iron main to be laid in *sand.*

Referring to detail of cost of laying 6-in. cast-iron main, we find that a trench 100 ft. long, 3 ft. deep, and 22 in. wide, will contain 550 cu. ft. Also, we observe that a laborer will move 150 cu. ft. of sand in one day. Now, the cubic feet to be moved, divided by the amount the laborer can move in a day, will of course, give us the number of days required to move these 550 cu. ft. so we have $\frac{550}{150}$=3.66 days.

Labor cost is $2.75 per day, and 3.66×2.75=$10.065, the cost of opening a trench 100 ft. long, or, 0.10065 per foot.

It was observed that a caulker and helper could make three joints per hour, or on the basis of ten joints per 100 hundred feet is 3½ hours @ 0.81 per hour = $2.70.

The same observation enables us to determine that one fitter and three helpers will lay three lengths per hour. On the basis of 8½ lengths per 100 ft., it will require 2⅔ hours, which @ $1.50 per hour, gives $4.25 as the cost of laying.

Backfilling is one-half the cost of laying, and therefore, the cost of laying one foot of 6-in. cast-iron pipe in sand, with trench size as above, is:

$0.10065 Trenching,
0.05032 Backfilling,
0.02700 Caulking,
0.04250 Laying.

Total $0.22047 Per Foot.

Cost of Laying 8-In. C. I. Pipe

Main 8 in. Depth 3⅓ ft. Width 2 ft. Length 100 ft.=633 cu. ft.

$\frac{633}{150}$=4.22 days @ $2.75=$11.605 Trenching.

Will caulk 3 joints per one hour and fifteen minutes; ten joints will take 4⅓ hours.

4⅓ hours @ $0.81 per hour=$3.375

Will lay 3 lengths per hour—2⅔ hours for 100 ft.

1 fitter, $3.75
6 helpers, 16.50

$20.55 for 8 hours=$2.53 per hour

2⅔ hours @ $2.53=$7.16 cost of laying.

Per Foot (Sand)

$0.1160 Trenching
0.0580 Backfilling
0.0337 Caulking
0.0716 Laying

0.2793 Total cost of laying 1 ft. of 8 in.

Per Foot (Rock)

$\frac{633}{65}$=9.7 days @ $2.75=$26.675

$0.2667 Trenching
0.1333 Backfilling
0.0337 Caulking
0.0716 Laying

$0.5053 Total Cost of Laying.

Cost of Laying 10-In. C. I. Pipe

Main 10 in. Depth 3⅓ ft. Width 3⅓ ft. Length 100 ft 722 Cu. Ft.

$\frac{722}{150}$=4.8 days @ $2.75=$13.20

Will caulk 2½ joints per hour; 10 joints @ $1.28=$5.12

2 Caulkers, $7.50
1 Helper, 2.75

$10.25

Will take 20 minutes to lay 1 length; 8½ lengths will take 2⅔ hours.

2 Fitters, $7.50
8 Helpers, 22.00

$29.50 for 8 hours=$3.68 per hour.

2⅔ hours @ $3.68=$10.42—cost of laying.

Per Foot (Sand)

$0.1320 Trenching
0.0660 Backfilling
0.0512 Caulking
0.1042 Laying

$0.3534 Total cost of laying 1 ft. of 10 in.

Per Foot (Rock)

$\frac{722}{65}$ Cu. Ft. Trench @ $2.75

$0.3025 Trenching
0.1512 Backfilling
0.0512 Caulking
0.1042 Laying

$0.6091 Total cost of laying 1 ft. of 10 in.

Cost of Laying 12-In. C. I. Pipe

Main 12 in. Depth 3½ ft. Width 2½ ft. Length 100 ft.=875 Cu. Ft.

$\frac{875}{150}$=5.8 days @ $2.75=$15.95

Will caulk 2 joints per hour; 10 joints @ 1.28=$6.40.

2 Caulkers, $7.50
1 Helper, 2.75

$10.25

Will take 20 minutes to lay 1 length, 8½ lengths will take 2⅔ hours.

2 Fitters, $7.50
10 Helpers, 27.50

$35.00 for 8 hours—$4.37 per hour.

2⅔ hours @ $4.37=$12.38 cost of laying.

Per Foot (Sand)

$0.1595 Trenching
0.0797 Backfilling
0.0640 Caulking
0.1238 Laying

$0.4270 Cost of Laying 1 ft. of 12 in.

Per Foot (Rock)

$\frac{875}{65}$ Cu. Ft. @ $2.75

$0.3685 Trenching
0.1482 Backfilling
0.0640 Caulking
0.1238 Laying

$0.7340 Cost of laying 1 ft. of 12 in.

Cost of Laying 16-In. C. I. Pipe

Main 16 in. Depth 3⅓ ft. Width 3 ft. Length 100 ft.=1,150 Cu. Ft.

$\frac{1150}{150}$=7.6 days @ $2.75=$20.90.

Will take 45 minutes to caulk 1 joint; 10 joints will take 7½ hours.

2 Caulkers, $7.50
1 Helper, 2.75

$10.25

7½ hours @ $1.28=$9.40

Will take 30 minutes to lay 1 length; 8½ lengths will take 4½ hours.

3 Fitters, $11.25
14 Helpers, 38.50

$49.75 for 8 hours=$6.22 per hour.

4¼ hours @ $6.22 per hour=$26.43.

Per Foot (Sand)

$0.2090 Trenching
0.1045 Backfilling
0.0940 Caulking
0.2643 Laying

$0.6718 Cost of laying 1 ft. of 16 in.

Per Foot (Rock)

$\frac{1150}{65}$ Cu. Ft. Trench @ $2.75

$0.4867 Trenching
0.2433 Backfilling
0.0940 Caulking
0.2643 Laying

$1.0883 Cost of laying 1 ft. of 16 in.

The same method has been followed in all cases, observations taken under various conditions for divers sizes of pipe, and the whole data collected, arranged and finally tabulated for use as shown in the several curves following, which are made up from this table, as here given for sand and rock.

Cost of Surveying

This is a general term under which there is considered the time consumed in looking over the job, to ascertain the physical possibilities.

There are in and about San Francisco many steep streets, which in outlying districts are not brought to grade and are not paved. When it becomes necessary to lay a main on such a street, it is the practice of the distribution department to send out some competent person to determine and report on the physical conditions existing, the probable number and location of drips, the best place to unload pipe and other material, and, in general, all data which will later be used in making up the estimate.

The same careful survey is made in any case which involves a piece of work of any magnitude.

The conditions which obtain in San Francisco are really peculiar, in that most all records were obliterated during the calamity which overtook the city in 1906.

In many cases of "Relay," extensive prospecting is required to determine the character of the soil underlying the pavement, in order that a fairly accurate eestimate may be made. All such preliminary work comes under the heading of "Survey."

Cost of Trenching

Actual trials were made under varying conditions of soil, to determine costs for standard trenches whose widths and depths are shown herewith:

Pipe	Depth	Width	Length		
½ in. W. I.	½ ft.	½ ft.	100 ft.	=	25 cu. ft.
¾ in. W. I.	¾ ft.	¾ ft.	100 ft.	=	56 cu. ft.
1 in. W. I.	1 ft.	1 ft.	100 ft.	=	100 cu. ft.
1¼ in. W. I.	2 ft.	1⅓ ft.	100 ft.	=	266 cu. ft.
1½ in. W. I.	2 ft.	1½ ft.	100 ft.	=	300 cu. ft.
2 in. W. I.	2⅛ ft.	1½ ft.	100 ft.	=	325 cu. ft.
2½ in. W. I.	2⁵⁄₂₄ ft.	1¹³⁄₂₄ ft.	100 ft.	=	329 cu. ft.
3 in. W. I.	2½ ft.	1⁷⁄₁₂ ft.	100 ft.	=	395 cu. ft.
4 in. O. D.	2½ ft.	1⅔ ft.	100 ft.	=	416 cu. ft.
6 in. O. D.	3 ft.	1⅝ ft.	100 ft.	=	550 cu. ft.
8 in. O. D.	3⅛ ft.	2 ft.	100 ft.	=	633 cu. ft.
12 in. O. D.	3½ ft.	2½ ft.	100 ft.	=	875 cu. ft.
16 in. O. D.	3⅝ ft.	3 ft.	100 ft.	=	1150 cu. ft.

The paving standard is a 6-in. concrete base with a topping of 3-in. bitumen.

It was found that a laborer could move in one day as follows:
Sand .....150 cu. ft. 1 day, 8 hrs. work @ $2.75 per day
Hard Ground..... 65 cu. ft. 1 day, 8 hrs. work @ $2.75 per day
Sand with paving.... 55 cu. ft. 1 day, 8 hrs. work @ $2.75 per day
Hard Ground with paving ..... 45 cu. ft. 1 day, 8 hrs. work @ $2.75 per day

It follows that the size of trench, divided by 100, and this quotient divided by what a man can move in a day, and multiplied by his wage, will give the cost of one lineal foot of trench, or, more correctly put:

$$\frac{\text{Table A}}{\text{Table B}} \times W = C \text{ per 100 ft., where}$$

W- wage and C-, the final cost per 100 ft. of trench.

As an example: What is the cost per lineal foot of a 16-in. trench in hard ground with paving:

A=1,150
B= 45
C= 275

$$\frac{1150}{45} \times 2.75 = 70.125 \text{ per 100 ft., or}$$

.70125 per lineal foot.

In the larger trenches, from 18 in. up, it was found necessary to use an extra man on top, to take away from the men below, and in back-filling, this extra man will show in the reduced cost for pipes above 18 in.

With labor at $2.75 per day, and an 8 hour day, both of which conditions obtained in this company's practice, the cost of trenching will be as follows:

Cost of Painting

All the work is done by hand, by one single man. This item includes the cost of handling from the storage pile. In the case of small sizes which come in bundles, it includes also the cost of cutting the wire fastening. The operation is as follows:

The bundles or single pipes are lifted by hand on a pair of trestles, inclined away from the painter. The fastenings, if any, are cut, and the painting proceeds by hand, starting at one end, the pipe being rolled back and forth and thoroughly coated. When finished, it rolls off the trestle and on two heavy wood sills, which prevent its coming in contact with the ground.

One man's record is 7,000 lineal feet of 2-in. pipe for one day; normally from 5,000 to 6,000 lineal feet of 2-in. pipe per day is considered a good day's work.

The average cost of labor would be about 0.00075 per lineal foot of pipe, and including cost of material and other overhead, the cost would be as shown in the curve following.

Painting devices have not been found a success, at least for small pipes, because of the time lost in plugging the ends of the pipe and other minor matters, which brought the price quite above that shown in the cost chart.

Carting and Warehouse Expense

As indicated in the heading, there are shown in the curve: The cost of carting from the railroad to the warehouse, the cost of hauling from the warehouse to the job, and, the cost of handling through the warehouse or storage yard.

The first and second items are derived from records extending over a large period of time, and include in addition to the labor involved in handling the material, a percentage of the fixed charges of the warehouse, such as clerical force, supervision, etc.

The third or warehouse expense item is made up from the same record, but the labor item includes handling of the material in the warehouse or yard, instead of the labor involved in loading and unloading, as in items one and two.

Labor costs, etc., are based on the number of men per day required to handle the pipe or material from the moment of unloading the cars or wagons (as the case may be) as they arrive at the railway depot or at the warehouse or yard.

Whenever it has been possible to anticipate the needs of a particular job, or whenever circumstances have permitted, orders are placed to save all the handling through the yard, and pipe will be hauled directly to the job from the railroad depot.

COST OF TRENCHING

Size of Pipe	½-in.	¾-in.	1-in.	1¼-in.	1½-in.	2-in.	2½-in.	3-in.	4-in.	6-in.	8-in.	10-in.	12-in.	16-in.	18-in.	20-in.	24-in.	30-in.
Sand	0.0044	0.01024	0.01815	0.0484	0.055	0.0577	0.06215	0.0723	0.0761	0.1006	0.1160	0.1320	0.1595	0.2090	0.2321	0.2530	0.4537	0.5692
Hard Ground	0.01045	0.02365	0.04207	0.11	0.1265	0.1375	0.143	0.1672	0.1760	0.2326	0.2667	0.3025	0.3685	0.4867	0.5335	0.5775	1.0456	1.3200
Sand with Paving	0.01237	0.02777	0.0495	0.132	0.1485	0.1622	0.1677	0.1977	0.2062	0.2750	0.3162	0.3575	0.4372	0.5747	0.6325	0.6875	1.2360	1.5592
Hard Ground with paving	0.015125	0.0341	0.0605	0.1622	0.1815	0.1980	0.2060	0.2417	0.2541	0.3355	0.3850	0.4400	0.5335	0.7012	0.7700	0.8470	1.5106	1.8970

In the case of high pressure pipe, the relatively high cost is due to length (40 ft.)—such length being so much more unwieldy to handle, particularly where the space is restricted, and the cost proportionately greater than for cast iron pipe of much shorter lengths though greater weights.

Cost of Caulking

This item includes the labor only; in the case of wrought iron pipe, the screwing up of the fittings, and for the cast iron pipe includes the yarning and pouring also.

The amount of lead and yarn used for each size pipe is given in the table below, and must be taken to represent the amount of each material used by this company after many years of experience, and applies for local conditions only:

Size of Main	4 in.	6 in.	8 in.	10 in.	12 in.	16 in.	18 in.	20 in.	24 in.	30 in.
Lead in lb.	8	12	14	17	24	32	37	42	50	68
Yarn	.3	.5	.55	.7	.8	1.2	1.45	1.66	2.	2.74

Cost of Laying

The numerical strength of gangs and time required to lay 8½ lengths of cast iron each is as follows:

Size	6 in.	8 in.	10 in.	12 in.	16 in.	20 in.	24 in.	30 in.
Fitters	1	1	2	2	3	3	4	5
Helpers	3	6	8	10	14	16	20	25
Time in Minutes	150	170	170	170	270	388½	637½	637½

It is understood that this work is done according to the "hand labor" method, without the use of any appliances of any sort or kind.

This item includes the handling of the pipe from the curb to the trench—the lowering and bringing to the required grade.

It is obvious that the character of material is not a factor in the cost of this item, such cost, therefore, remaining the same for the four classes, as shown in the table.

In connection with this item, it might be well to state that the use of blocking is the usual practice followed, and whenever used the following sizes are the standard:

Size	6 in.	8 in.	10 in.	12 in.	16 in.	20 in.	24 in.	30 in.
Size of Main, 3 in. to 8 in.			10 to 12 in.			24 to 30 in.		16 to 20 in.
Size of Blocking, 3 in. x 12 in. x 12 in.			3x12x24 in.			3x12x18 in.		4x12x30 in.

The first figure gives the thickness; the second the width; and last, the length of the block, and their bearing capacity is computed to stand a prism of material whose depth is that of the trench; whose width is equal to the outside diameter of the pipe, and whose length is equal to the length of the pipe which the block supports.

Cost of Backfilling

The cost of backfilling is based on the cost of trenching, and is derived from numerous observations made by the foreman and others concerned, covering every possible combination of conditions. This cost is taken as one-half that of trenching in sand or ordinary soil, with and without paving, and applies to all sizes up to and including 18 in.

Cost Chart For Low Pressure Gas Mains

Size and Kind of Pipe	Kind of Main	Kind of Soil	Survey	Trenching	Coupling or Caulking	Laying	Back Filling	Lead and Yarn	Fittings	Pipe R.R. Cars S.P.	Cartage Cars to Warehouse	Cartage Warehouse to Jobs	Warehouse Expense	Painting	Distribution Office Expense	Total Cost per Net Per Inch Condition	Average Cost per Foot
2" W.I.		Sand	.02	.0044	.00075	.00075	.0018		.0015	.024	.000418	.000687	.0005	.0005	.0005	.033243	
		Gravel	.02	.01043	.00075	.00075	.0018		.0015	.024	.000418	.000687	.0005	.0005	.0005	.063913	.043637
		Macadam	.02	.01837	.00075	.00075	.0018		.0015	.024	.000418	.000687	.0005	.0005	.0005	.063913	
		Wood Paving	.02	.015185	.00075	.00075	.00525		.0015	.024	.000418	.000687	.0005	.0005	.0005	.04969	
3" W.I.		Sand	.02	.01025	.001	.001	.00315		.002	.028	.000357	.000836	.0005	.0005	.0005	.070853	
		Gravel	.02	.02365	.001	.001	.01185		.002	.028	.000357	.000836	.0005	.0005	.0005	.09036	.0873
		Macadam	.02	.05177	.001	.001	.00315		.002	.028	.000357	.000836	.0005	.0005	.0005	.08778	
		Wood Paving	.02	.0341	.001	.001	.01185		.002	.028	.000357	.000836	.0005	.0005	.0005	.10081	
4" W.I.		Sand	.02	.01813	.0018	.0018	.00607		.0028	.048	.000853	.001223	.0005	.0005	.0005	.097100	
		Gravel	.02	.04207	.0018	.0018	.01185		.0028	.048	.000853	.001223	.0005	.0005	.0005	.13348	.12818
		Macadam	.02	.04393	.0018	.0018	.00607		.0028	.048	.000853	.001223	.0005	.0005	.0005	.11915	
		Wood Paving	.02	.0603	.0018	.0018	.01185		.0028	.048	.000853	.001223	.0005	.0005	.0005	.15211	
12" W.I.		Sand	.02	.0484	.0014	.0014	.0045		.0034	.059	.00118	.00168	.0005	.0005	.0005	.16210	
		Gravel	.02	.11	.0014	.0014	.035		.0034	.059	.00118	.00168	.0005	.0005	.0005	.2148	.2422
		Macadam	.02	.132	.0014	.0014	.0242		.0034	.059	.00118	.00168	.0005	.0005	.0005	.2457	
		Wood Paving	.02	.1662	.0014	.0014	.035		.0034	.059	.00112	.00168	.0005	.0005	.0005	.3067	
16" W.I.		Sand	.02	.035	.00166	.00166	.0075		.0042	.089	.00134	.00201	.0005	.0005	.0005	.1839	
		Gravel	.02	.1265	.00166	.00166	.0625		.0042	.089	.00134	.00201	.0005	.0005	.0005	.2911	.2746
		Macadam	.02	.1485	.00166	.00166	.0275		.0042	.089	.00134	.00201	.0005	.0005	.0005	.2714	
		Wood Paving	.02	.1815	.00166	.00166	.0625		.0042	.089	.00134	.00201	.0005	.0005	.0005	.3461	
2" W.I.		Sand	.02	.0377	.01	.01	.0288		.02	.098	.0018	.0027	.001	.001	.001	.2485	
		Gravel	.02	.1373	.01	.01	.0937		.02	.098	.0018	.0027	.001	.001	.001	.3527	
		Macadam	.02	.1628	.01	.01	.0288		.02	.098	.0018	.0027	.001	.001	.001	.3303	.3446
		Wood Paving	.02	.1980	.01	.01	.0937		.02	.098	.0018	.0027	.001	.001	.001	.4218	
24" W.I.		Sand	.025	.04218	.0115	.0115	.03107		.03	.145	.00287	.0045	.0015	.0015	.001	.38739	
		Gravel	.025	.1457	.0115	.0115	.0715		.03	.145	.00287	.0045	.0015	.0015	.001	.44867	.43081
		Macadam	.025	.1677	.0115	.0115	.03107		.03	.145	.00287	.0045	.0015	.0015	.001	.43284	
		Wood Paving	.025	.2240	.0115	.0115	.0715		.03	.145	.00287	.0045	.0015	.0015	.001	.51187	
3" W.I.		Sand	.025	.0723	.015	.015	.0361		.04	.193	.0037	.0036	.002	.002	.001	.4107	
		Gravel	.025	.1678	.015	.015	.0836		.04	.193	.0037	.0036	.002	.002	.001	.3351	.5318
		Macadam	.025	.1877	.015	.015	.0361		.04	.193	.0037	.0036	.002	.002	.001	.3261	
		Wood Paving	.025	.2417	.015	.015	.0836		.04	.193	.0037	.0036	.002	.002	.001	.6676	
3" C.I.		Sand	.025	.0723	.0168	.03	.0361	.0235	.016	.281	.0052	.0093	.002		.001	.3106	
		Gravel	.025	.1678	.0168	.03	.0836	.0235	.016	.281	.0052	.0093	.002		.001	.5610	.5398
		Macadam	.025	.1877	.0168	.03	.0361	.0235	.016	.281	.0052	.0093	.002		.001	.5240	
		Wood Paving	.025	.2417	.0168	.03	.0836	.0235	.016	.281	.0052	.0093	.002		.001	.7325	
4" C.I.		Sand	.03	.0761	.0208	.0375	.0380	.0375	.018	.345	.0066	.0144	.0025		.001	.6756	
		Gravel	.03	.1760	.0208	.0375	.0880	.0375	.018	.345	.0066	.0144	.0025		.001	.7793	.7866
		Macadam	.03	.1968	.0208	.0375	.0380	.0375	.018	.345	.0066	.0144	.0025		.001	.7897	
		Wood Paving	.03	.2541	.0208	.0375	.0880	.0375	.018	.345	.0066	.0144	.0025		.001	.8576	
6" C.I.		Sand	.037	.1008	.0270	.0425	.0503	.0375	.024	.512	.0132	.0228	.0041		.002	.8930	
		Gravel	.037	.2388	.0270	.0425	.1163	.0375	.024	.512	.0132	.0228	.0041		.002	1.0930	1.0635
		Macadam	.037	.2750	.0270	.0425	.0503	.0375	.024	.512	.0132	.0228	.0041		.002	1.0894	
		Wood Paving	.037	.3355	.0270	.0425	.1163	.0375	.024	.512	.0132	.0228	.0041		.002	1.1959	
8" C.I.		Sand	.043	.1160	.0337	.0715	.0580	.060	.032	.709	.0214	.0321	.0079		.002	1.1947	
		Gravel	.043	.2667	.0337	.0715	.1333	.060	.032	.709	.0214	.0321	.0079		.002	1.4207	1.3873
		Macadam	.043	.3168	.0337	.0715	.0580	.060	.032	.709	.0214	.0321	.0079		.002	1.3949	
		Wood Paving	.043	.3850	.0337	.0715	.1333	.060	.032	.709	.0214	.0321	.0079		.002	1.5380	
10" C.I.		Sand	.052	.1320	.0511	.1042	.0660	.089	.04	.942	.0285	.0428	.01		.002	1.3697	
		Gravel	.052	.3025	.0511	.1042	.1511	.089	.04	.942	.0285	.0428	.01		.002	1.6256	
		Macadam	.052	.3578	.0511	.1042	.0660	.089	.04	.942	.0285	.0428	.01		.002	1.5718	1.7083
		Wood Paving	.052	.4400	.0511	.1042	.1511	.089	.04	.942	.0285	.0428	.01		.002	1.8629	
12" C.I.		Sand	.065	.1595	.0640	.1238	.0797	.112	.051	1.24	.0362	.0543	.015		.002	2.0125	
		Gravel	.065	.3865	.0640	.1238	.1845	.112	.051	1.24	.0362	.0543	.015		.002	2.3240	2.2799
		Macadam	.065	.4378	.0640	.1238	.0797	.112	.051	1.24	.0362	.0543	.015		.002	2.2902	
		Wood Paving	.065	.5335	.0640	.1238	.1845	.112	.051	1.24	.0362	.0543	.015		.002	2.4910	
16" C.I.		Sand	.074	.2090	.0940	.2643	.1045	.15	.089	1.66	.0535	.0808	.047		.003	3.0483	
		Gravel	.074	.4667	.0940	.2643	.2435	.15	.089	1.66	.0535	.0808	.047		.003	3.4460	3.4028
		Macadam	.074	.5747	.0940	.2643	.1045	.15	.089	1.66	.0535	.0808	.047		.003	3.4135	
		Wood Paving	.074	.7012	.0940	.2643	.2435	.15	.089	1.66	.0535	.0808	.047		.003	3.6603	
18" C.I.		Sand	.08	.2321	.1060	.3324	.1080	.177	.109	2.16	.0642	.0962	.054		.0035	3.5404	
		Gravel	.08	.5335	.1060	.3324	.2667	.177	.109	2.16	.0642	.0962	.054		.0035	4.0028	3.9507
		Macadam	.08	.6385	.1060	.3324	.1080	.177	.109	2.16	.0642	.0962	.054		.0035	3.9408	
		Wood Paving	.08	.7700	.1060	.3324	.2667	.177	.109	2.16	.0642	.0962	.054		.0035	4.2590	
20" C.I.		Sand	.088	.2530	.1280	.4398	.1263	.197	.109	2.64	.0745	.1117	.062		.0035	4.2310	
		Gravel	.088	.5775	.1280	.4398	.2987	.197	.109	2.64	.0745	.1117	.062		.0035	4.9177	4.6503
		Macadam	.088	.6975	.1280	.4398	.1265	.197	.109	2.64	.0745	.1117	.062		.0035	4.6655	
		Wood Paving	.088	.8470	.1280	.4398	.2987	.197	.109	2.64	.0745	.1117	.062		.0035	4.9872	
24" C.I.		Sand	.104	.4537	.1920	.9896	.1512	.235	.168	3.39	.1003	.1504	.12		.004	5.9982	
		Gravel	.104	1.0458	.1920	.9896	.3437	.235	.168	3.39	.1003	.1504	.12		.004	6.7839	6.7027
		Macadam	.104	1.2360	.1920	.9896	.1512	.235	.168	3.39	.1003	.1504	.12		.004	6.7820	
		Wood Paving	.104	1.5108	.1920	.9896	.3437	.235	.168	3.39	.1003	.1504	.12		.004	7.2467	
30" C.I.		Sand	.13	.5698	.2240	1.1615	.1897	.397	.186	4.57	.1451	.2176	.14		.004	7.9352	
		Gravel	.13	1.3200	.2240	1.1615	.4400	.397	.186	4.57	.1451	.2176	.14		.004	8.9370	8.6262
		Macadam	.13	1.5532	.2240	1.1615	.1897	.397	.186	4.57	.1451	.2176	.14		.004	8.9258	
		Wood Paving	.13	1.8970	.2240	1.1615	.4400	.397	.186	4.57	.1451	.2176	.14		.004	9.5140	

For sizes above 18 in., one-third the cost of trenching is taken. This is due to the cost of trenching for the larger size, which necessitates the use of an extra man to take away the dirt as thrown out by two men in the trench. In backfilling, it is obvious that one man on top can throw as much in a shallow trench as in a deep one, and therefore, the cost of backfilling is decreased correspondingly, by the labor cost of one man who was serving two in the trenches. In other words, when the trenching requires two-men labor, the backfilling is done by one man or one-half the cost of trenching, and when the trenching requires three men the backfilling is still done by one man or one-third the cost of trenching.

COST OF LAYING 20-IN. C. I. PIPE

Main 20 in. Depth 4⅙ ft. Width 3⅓ ft. Length 100 ft.=1,388 Cu. Ft.

1388 / 150 =9.2 days @ $2.75=$25.30

Will take 1 hour to caulk 1 joint; 10 joints @ $1.28=$12.80.

Will lay 1 length in 45 minutes; 8½ lengths will take 6 hours and 22½ minutes.

100 ft. @ $6.90 per hour=$43.98.

3 Fitters,	$11.25
16 Helpers,	44.00

$55.25 for 8 hours=$6.90 per hour.

Per Foot (Sand)

$0.2530	Trenching
0.1265	Backfilling
0.1280	Caulking
0.4398	Laying
$0.9473	Cost of laying 1 ft. of 20 in.

Per Foot (Rock)

1388 / 65 =21 days @ $2.75

$0.5775	Trenching
0.2887	Backfilling
0.1280	Caulking
0.4398	Laying
$1.4340	Cost of laying 1 ft. of 20 in.

COST OF LAYING 24-IN. C. I. PIPE

Main 24 in. Depth 4½ ft. Width 3⅗ ft. Length 100 ft.=1,650 Cu. Ft.

1650 / 150 =11 days @ $4.12=$45.37

1 man on top
2 men in ditch

Will take 1½ hours to caulk 1 joint; 10 joints will take 15 hours.

2 Caulkers,	$ 7.50
1 Helper,	2.75
	$10.25

15 hours @ $1.28=$19.20

Will lay 1 length in 1¼ hour; 8½ lengths will take 10⅝ hours @ $8.75 per hour=$92.96.

4 Fitters,	$15.00
20 Helpers,	$55.00

$70.00 for 8 hours=$8.75 per hour.

Per Foot (Sand)

$0.4537	Trenching
0.15125	Backfilling
0.1920	Caulking
0.9296	Laying
$1.7265	Cost of laying 1 ft. of 24 in.

Per Foot (Rock)

1650 / 65 =Cu. ft. @ $4.12

$1.0469	
0.3437	Backfilling
0.1920	Caulking
0.9296	Laying
$2.5122	Cost of laying 1 ft. of 24 in.

COST OF LAYING 30-IN. C. I. PIPE

Main 30 in. Depth 5 ft. Width 4⅙ ft. Length 100 ft.=2,083 Cu. Ft.

2083 / 150 =@ $4.12 per day=$56.92

Will caulk 1 joint in 1¾ hours; 10 joints will take 17½ hours @ $1.28=$22.40.

5 Fitters,	$18.75
25 Helpers,	68.75

$87.50 for 8 hours=$10.93 per hour.

Will lay 1 length in 1¼ hours; 8½ lengths will take 10⅝ hours. 10⅝ hours @ $10.93 per hour=$116.13.

Per Foot (Sand)

$0.5692	Trenching
0.1897	Backfilling
0.2240	Caulking
1.1613	Laying
$2.1442	Cost to lay 1 ft. of 30 in.

Per Foot (Rock)

2083 / 65 =@ $4.12=$1.32

$1.3200	Trenching
0.4400	Backfilling
0.2240	Caulking
1.1613	Laying
$3.1453	Cost to lay 1 ft. of 30 in.

Gas Will Hold Its Place in Future for Cooking Because It Is Best Fuel for Purpose

F. S. Wade Disputes Points of Superiority Claimed By Competitors—Asserts There Is Little Need to Make Gas Range Cheaper, But Efforts Should Be Directed to Making It Better and More Convenient

In carrying on our campaign for a larger use of gas for cooking we must bear one thing firmly in mind, declared F. S. Wade, of the Southern Counties Gas Company, in a paper presented at the recent annual convention of the Pacific Coast Gas Association. Gas is not the cheapest fuel for cooking but the best!

Gas will not hold its place in the future because of its cheapness, but because it is superior to every other medium for cooking purposes.

Food properly cooked with gas retains its flavor better than when cooked otherwise.

Meat cooked in a roaster in a gas oven loses no more weight than by any other means of cooking, and meat broiled under a gas flame is incomparable both in quality and conservation of healthful contents. If the consumer desires his food prepared after the fireless cooker principle, the new heat conserving gas ovens will also do this better than it can be done by any other device. Admittedly, however, food thus cooked can in no way be compared with that cooked with free ventilation.

OTHER POINTS OF SUPERIORITY

Other points of superiority which the gas range possesses over all its competitors are, its ability to supply large quantities of available heat on an instant's demand; and the fact that any desired number of cooking "heats" can be had simply by moving a valve.

Little more needs to be done to make the gas range cheaper. It is already cheap enough. The work of the gas man from now on should be to induce the manufacturer to make gas ranges better, and more convenient rather than lower in cost.

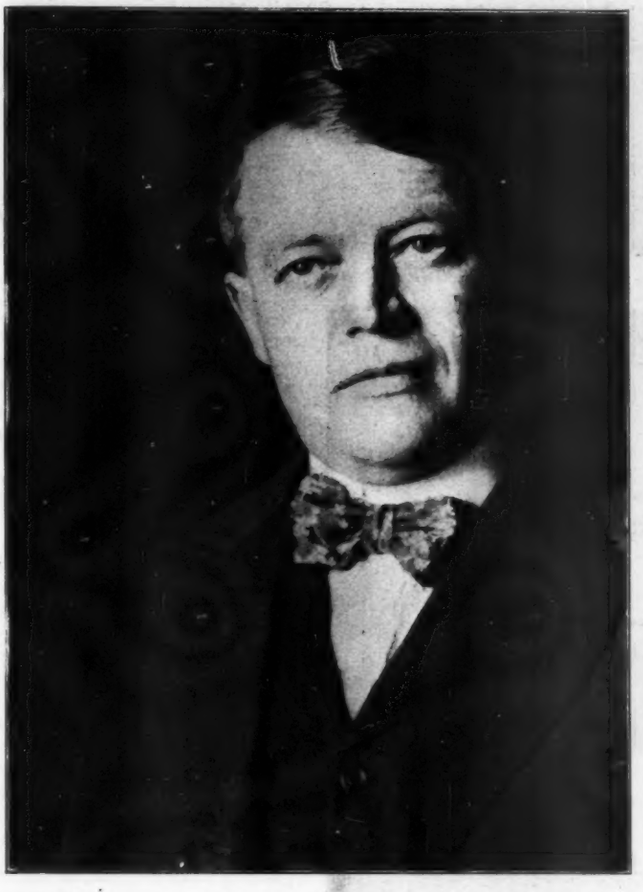
The constant lowering of prices under severe competitive pressure has, up to this time, left the range manufacturer little excess margin of profit to be used in research work or general advertising.

In this connection it is somewhat humiliating for the wholehearted gas man to observe that advertisements of the supposedly obsolete kerosene stove usually occupy twice as much space in magazines of general circulation as do gas range advertisements. If we do pay the manufacturer a price that yields him a liberal profit, perhaps he will spend some of this same profit to tell the world the advantages of gas for cooking.

News of the Gas Industry

Michigan Gas Association in Convention at Detroit

Papers Presented Mainly of Useful Type and Replete in Valuable Information—Many Take Part in Discussions —Glenn R. Chamberlain Elected President for Ensuing Year



GLENN R. CHAMBERLAIN, NEW PRESIDENT OF THE ASSOCIATION

BURTON LARAWAY, RETIRING PRESIDENT

Another notable convention has been added to the many successful ones. The convention of the Michigan Gas Association held last week at Detroit, surpasses all previous conventions of the society in attendance, in the excellence of the subjects discussed and the interest taken in the discussions.

Burton Laraway, president of the association, and secretary and general manager of the Michigan Light Company at Jackson, presided at the meeting. His opening address as president, was short, because, as he said, the officers of the association had had a great deal to do during the year, and he was satisfied to let the work speak for itself.

The report of the Committee on Affiliation with the American Gas Institute was presented by Warren S. Blauvelt, consulting engineer of the Steere Engineering Company, of Detroit, and was favorably considered by the convention. The executive committee was empowered to make the arrangements for the affiliation with the institute.

When Clark R. Graves, general manager of the Lansing Fuel and Gas Company, read his report as Secretary of the Association, he showed a net increase in membership (after deducting all members who had not paid up to Jan. 1), of thirty-seven members. The association now has an active membership of approximately three hundred.

The first paper to be presented was entitled "Heat Treatment of Brass in Neutral and Reducing Atmospheres," by Prof. Alfred H. White of the University of Michigan, and Bert A. Standerline, holder of the Michigan Gas Association Fellowship in Gas Engineering at the University of Michigan.

J. W. Batten, Engineer of the Detroit City Gas Company, crystallized the importance of the experimental work carried on at the University of Michigan, when he said that the function of the University stops when it has developed a piece of apparatus to a point where it seems probable some manufacturer could take it and develop it into something of commercial value. A series of very interesting experiments has been carried on covering a period of five years, by Prof. White's department at the University of Michigan, on the weathering of gas coals. The summary of these experiments was presented in a paper. The Bureau of Mines of the Federal Government has also been interested in this work and has co-operated to some extent with Prof. White in his experiments. Some interesting information regarding the storage of the coal developed in the discussion. It seems when a team and scraper were used underneath the coal-chute, and the coal pile is built up through that means that no heating results, but that where

THE GREAT MAJORITY OF THOSE IN ATTENDANCE AT THE CONVENTIONS

the coal is shot out into a pile and allowed to run, the lumps go down to the bottom and the pile through that process comes to have natural chimneys in it. This naturally leads to spontaneous combustion.

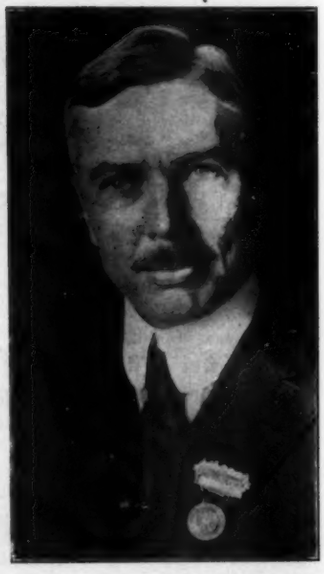
A feature of the program of the convention was the opportunity given the appliance men to speak briefly on four subjects of special interest to the gas manufacturers. The subjects discussed were Water heaters, hotel ranges, gas lighting and domestic gas ranges. Those taking part were: F. A. Lemke, secretary and treasurer of the Humphrey Manufacturing Company; L. B. Young, general manager of the Michigan Stove Company; W. M. Blinks, assistant secretary of the General Gas Light Company, and Harry Schall, assistant to vice-president of the Detroit Stove Works.

CLARK R. GRAVES, WHO SUCCEEDS HIMSELF AS SECRETARY-TREASURER

B. W. DOUGLAS, WHO PRESENTED THE PAPER ON LABOR SAVING BENCHES FOR MEDIUM SIZED GAS WORKS

Ivan A. Hoy, of the Peoples Gas Light & Coke Company of Chicago, in discussing the policy of that company in getting new business said, among other things, that the work is divided into four departments: Range cooking and broilers, water heating, baking, and all other classes under the head of specialties. They look at hotel and restaurant work from the standpoint of the work to be performed rather than the kind of appliance used. Mr. Hoy's company furnished a maintenance at cost for contract customers. The charges for monthly maintenance and inspection on a yearly contract are, roughly: 50 cents per month for one section of a hotel range, 50 cents per month for an ordinary tank water heater, 50 cents per month for a cake griddle of five burners or more and 75 cents for a broiler. The charges for this work are based on a list of the appliances and estimated cost of their maintenance after having been put in maintainable condition by the company.

On Thursday afternoon, instead of having a regular session of the convention the association chartered the steamer "Pleasure" and practically everyone in attendance at the convention went on the afternoon's outing. Deck sports and dancing formed the principal entertainment. Prizes were given to the winners in the contests. Dinner was served on the boat, and the party returned to the Hotel after having had, as every one agreed, an exceedingly good time. The Citigas Saxaphone Band, made up of employees of the Detroit City Gas Company, furnished very delightful music. Richard Fowler of the Detroit City Gas Company was in charge of the entertainments of the convention and deserves a great deal



ALFRED H. WHITE, PROFESSOR OF CHEMICAL ENGINEERING AT THE UNIVERSITY OF MICHIGAN

PARTICIPANTS IN THE EXCURSION ON THE STEAMER PLEASURE

of credit for producing high-class entertainment and making everybody welcome at the convention. It should not be forgotten that special entertainment was provided for the ladies while the business sessions of the convention were going on.

The discussion was so generally participated in at the first session of the convention that Thursday morning's program was not completed until the beginning of the second session. The Friday morning session was opened by the presentation of a paper by W. M. Blinks, on "Present and Future Manufacturing of Gas Lighting." The discussion was led by Glenn R. Chamberlain, vice-president of the Association, and the newly elected president. Mr. Chamberlain suggested that it would seem to be wiser to spend more effort on getting the lighting for the modest store fronts, and less effort on the expensive store lighting. Lighting business of that character is practically permanent and is more profitable.

Harry Schall, assistant to the vice-president of the Detroit Stove Works, presented a paper on "Present and Future Manufacturing of Domestic Gas Ranges."

The next paper presented was by E. C. Campbell, manager of the Benton Harbor-St. Joseph Gas Company, on "The Importance of Sizing Equipment as Applied to the Sale of Coke in Small Towns." The discussion of this paper was taken up in connection with a paper read by Secretary Graves from F. Remington, superintendent of the Calhoun Gas Company, of Battle Creek.

The first Friday afternoon subject to receive consideration was "Japanning Ovens—Gas vs. Electricity" by Homer Hood, of the Industrial Department of the Detroit City Gas Company. This paper was discussed in connection with a paper by Prof. Alfred H. White and John T. Naylon, on "The Influences of Gases Within the Kiln on Baking Japans."

An inspiring talk on "Preparedness" was then made by Henry L. West of New York City, late commissioner District of Columbia, supplied to the Michigan Gas Association through the Conference Committee on National Preparedness of New York City.

The proposal to raise the dues to five dollars a year was rejected. Dues will remain the same and members of the Michigan Gas Association desiring to take advantage of the affiliation agreement with the institute are privileged to become members of the Institute upon the payment of two dollars.

The officers elected for the ensuing year were as follows: President, Glenn R. Chamberlain, secretary of the Grand Rapids Gas Light Company, Grand Rapids; vice-president, A. L. Wilkinson; secretary-treasurer, Clark R. Graves, general manager of the Lansing Fuel & Gas Company.

The selection of the next place of meeting was left to the executive committee. The plan of holding a two-day convention proved very popular this year, and it is probable that this plan will be followed for at least another year.

150 Present at First Day's Session of Pacific Coast Gas Association Convention

Committee on Public Relations Recommends that Entire Jurisdiction as to the Regulation of All Public Utilities Should be Lodged in One Utilities Commission which Should Also Have Control Over Municipalities Engaged in Competitive Service

The roll call at the first day's session of the annual convention of the Pacific Coast Gas Association, held at Santa Barbara, Cal., Sept. 19-22, showed that 150 members were in attendance. Following the president's address, the program was started with the paper on "The Preparation and Use of Iron Oxide for Gas Purification," by E. S. Jones.

In the report of the Public Policy Committee it was recommended, "that a strong and persistent effort should be made to land the entire jurisdiction as to the regulation of all public utilities in one public commission, and among the utilities to be so regulated should be included all municipalities that engage in competitive service."

The report of Henry Bostwick, secretary and treasurer of the association, showed that 87 new members have been added during the year and that $5,000 was paid out for the maintenance of the chair in gas engineering at the University of California. Santa Cruz was selected for next year's convention.

Municipal Gas Plant May be Built at Cincinnati

A committee to ascertain the feasibility of the city's buying the present plant of the Union Gas & Electric Company, or of building a new one to manufacture artificial gas, will be appointed in the near future by the Federated Improvement Association, of Cincinnati, Ohio. This was determined upon at a meeting of the association held Sept. 14. Members of the proposed committee must understand the workings of a gas plant, and its duty will be to ascertain what it would cost to produce artificial gas at the nearest coal mine, and pipe it to the city.

Hortonville, Wis., Gas Plant Sold

The Hortonville Light, Heat & Power Company of Hortonville, has been sold to the Electrical Engineering & Equipment Company of Milwaukee.

Chicago Aldermen Agree to Negotiate on Rate Settlement Out of Court

Such a Course Would be Agreeable to Company, which Wants, Among Other Things, Adoption of Sliding Scale Rate so it can be in Position to Obtain Fuel and Heating Business

The Chicago City Council's special committee on gas rate litigation, Sept. 23, accepted the proposal of Samuel Insull, chairman of the board of the Peoples Gas Light & Coke Company, that the city authorities and representatives of the gas company begin negotiations looking to a settlement, out of court, of the gas rate case pending in that city.

E. J. Cowdery, president of the gas company, has announced that the company was not only ready to begin negotiations for the settlement of the suit, but was willing to take up the question of granting refunds to consumers who have been obliged to pay more than the rate prescribed by the city ordinance since 1911.

Among the questions to be settled are: The fixing of the amount refunds to be paid consumers under the present rate ordinance; the question of valuation of the gas company's property; the company's proposal to change the standard requirement of candle power to heat unit; the fixing of a new rate for the new five-year period, and the fixing of this proposed new rate on a heat unit basis. Also the rate for the transitional period during changes to the gas company's plant to produce heat unit instead of candle power, and the company's proposal that a sliding scale rate be authorized instead of the present flat rate per thousand cubic feet.

According to Mr. Cowdery, it is felt that if these disputes are settled out of court, such an action will have a far reaching effect throughout the United States. He further declares that the income per consumer was decreasing, and argued in favor of a sliding scale of rates to make it possible for heat to be used for manufacturing purposes in large amounts.

"In 1906" stated Mr. Cowdery, "the annual income from a consumer was from $31 to $33. Last year it was $25.50."

It is argued that the company could get many large consumers if it could furnish gas at a lower rate to them, "for instance, many people could afford to heat their homes with gas if they could get it for 40 cents per thousand, many manufacturers could use large quantities if they could get it for 50 cents. It could be used for many other purposes for 60 cents. "The company is now selling gas to one out of every four people in the city of Chicago, so it is stated, as evident, that there is no room for the company to expand except by selling to large consumers, which is possible only by the adoption of a sliding scale of rates."

The Geist Company Invites Freeport, Ill., to Employ Experts to go Over Its Books

There will be no further reduction in the gas rates for Freeport, Ill., according to C. H. Geist, president of the C. H. Geist Company, which owns the gas plant in that city, such a reduction being economically impossible.

According to both Mr. Geist and H. S. Schutt, general manager of the company, if the company should reduce its rates from $1 to 95 cents per thousand, it could not take care of its plant in the proper manner, nor could it guarantee efficient service as the earnings of the company would not warrant it.

"This is a very poor time to ask for a reduction in anything," stated Mr. Geist, "as labor has increased 17 per cent, materials used in making gas and operating the company have increased from 25 to 40 per cent, and the oil used in making the gas has increased almost 100 per cent."

The report of the company showed that it has spent a total of $190,000 in improving the plant since it had taken it over. The officials stated that there was not a plant in the United States that was better equipped than the Freeport plant, and that they had done everything possible to make it one of the best plants in the country. Mr. Geist stated that if the city desired to hire an expert to go over the company's books, they would welcome him, and assist him in every manner possible. He further stated that, if such an expert could show where the company could reduce its rates, it would do so.

Since 1912 the company's business has increased 17,000,000 cu. ft. or a total of about 15 per cent, and at a rate of 5 per cent per year. This is the smallest increase in business shown by any of the Geist Company's plants.

"Freeport is not growing," stated Mr. Geist. "You need more factories to build up your city."

Both officials of the company stated that they desired to give everyone a fair and square deal, and cited their report to show that they were doing so. At any time that the volume of the company's business warrants its making lower rates to the small consumer, it is promised that such a reduction will gladly be made.

Bushwick and Ridgewood Sections of Brooklyn Prefer Gas Illumination to Unsightly Electric Light Poles

A resolution demanding that permits issued for the erection of electric light poles in the Bushwick and Ridgewood sections of Brooklyn, N. Y., be revoked, and setting forth that the community is satisfied with the present methods of illuminating the streets by gas, was unanimously adopted at the meeting of the Twenty-eighth Ward Taxpayers' Protective Association, held Sept. 13. Copies of the resolution will be sent to the Public Works Department and to the Department of Water Supply Gas & Electricity.

Consolidated Gas Company Leases Plot at $200,000 Rental

The Consolidated Gas Company of New York has leased a plot of 100x120 ft., on the south side of West 65th street, west of Amsterdam avenue, for a term of years, at an aggregate rental of $200,000.

Arrangements have been made to improve the site with a three-story garage, storage and repair shop.

Tonawanda's Slogan Sign is Flood-Lighted By Gas Arcs

The slogan sign of Tonawanda, N. Y., was lighted for the first time recently and was viewed with much enthusiasm by the citizens. The sign is in the form of a triangle with the words "Spend in the Tonawandas" at the apex, and the name, Niagara Light, Heat & Power Company, underneath. The sign is flood-lighted by gas arcs, and maintained free by the company.

Construction Notes

Waterville, Me., Company to Erect a New Holder and Bench of Sixes

The Kennebec Gas & Fuel Company of Waterville, Me., will be in the market in a short time for a 100,000 cu. ft. capacity holder, and an additional bench of sixes, exhauster and approximately seven miles of new mains from 3 inches to 6 inches in diameter. The mains will be laid next spring, and the holder, bench and exhauster will be constructed during the winter or early spring months. Mr. W. T. Fritchman is managing director and engineer of the company.

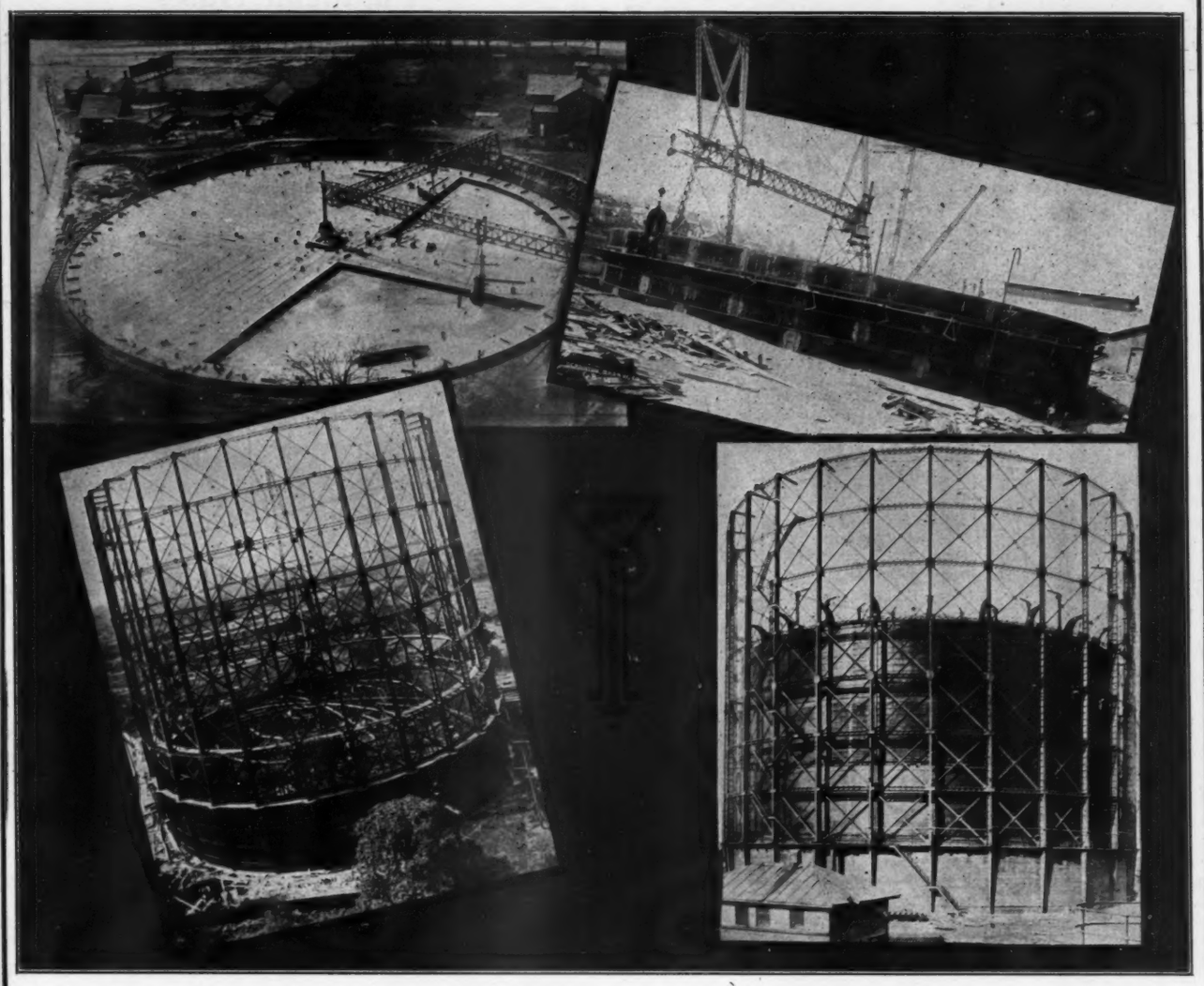
Utica Gas & Electric Company Lets Contract for New Apparatus

The Utica Gas & Electric Company of Utica, N. Y., has let contracts for the following apparatus: One 200,000 cu.ft. gas holder to be erected at their station at Ilion, N. Y., to the Stacey Manufacturing Company of Cincinnati, Ohio.; the furnishing and erection of a 2,000,000-ft. Williamson Gas Generator, to be located at the Utica Station of the Company, to the Bartlett-Hayward Company of Baltimore, and two purifying boxes, each 34x20x11½ ft. deep to the Western Gas Construction Co. of Fort Wayne, Ind. William J. Cahill is general manager of the gas department of the company.

Crisfield Company Installs New Compressor

The Crisfield Light & Power Company has just completed the installation of a new gas compressor of the Rand & Ingersoll, straight line, steam driven type. This machine is considerably

Continued on Page 18 of the Advertising Section.



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Construction Notes, continued from page 224.

larger than the first compressor installed when the plant was built. The continuous increase in the number of consumers had outgrown the old machine, which is now kept in reserve for trouble or breakdown. R. G. Anklam is superintendent of the company.

St. Paul Company Starts Work on $250,000 Project

The St. Paul Gas Light Company, of St. Paul, Minn., has started work on its $250,000 improvement project. A contract has been let to the United States Cast Iron Pipe & Foundry Company, of Burlington, N. J., for pipe to the amount of $54,000. A new main will be laid from the H. Koppers Coke & Gas Company plant along Hamline avenue to its plant on the Mississippi River. Work has been started on the new purifying plant and boiler house. Contracts for large gas purifiers has been let and all the work will be finished by July 1, 1917. Mr. Paul Doty is general manager for the company.

TOPEKA, KAN.—Authority has been granted to the Bonner Springs Gas & Electric Company to issue bonds to the amount of $30,000, two-thirds of which is for the purchase of the property of the newly organized company, and the balance to be used for extensions and improvements. The Weir Gas Company of Weir City has been authorized to issue $20,000 in bonds for improvements and extensions.

BALTIMORE, MD.—The Gas & Electric Company has let contract for a gas plant at Race & Barney Streets, to the Bennett Building Company of Baltimore. Contract price about $45,000.

CAMBRIDGE, MASS.—The Cambridge Gas Light Company is engaged in laying a new main in Magazine Street.

LEE, MASS.—Work has been started by the Pittsfield gas company on the extention of its mains to Lee.

RIVERDALE, MASS.—The Gloucester Gas Company will, in the near future, extend its mains to Riverdale.

BERMIDJU, MINN.—The Public Improvement Company, of Minneapolis, has asked the City Council for a 25-year franchise to operate a gas plant in Bermidju. The franchise requested places the rate per 1,000 cu. yd. at $1.60, and states that the company will commence work on the installation of the service within 60 days after the passage of the franchise.

HUTCHINSON, MINN.—The Hutchinson Gas Company plans to build a gas plant in this city, cost about $30,000. Inquiries should be addressed to the Gas & Electric Construction Company.

WABASHA, MINN.—The Wabasha Gas Company plans to build a plant costing about $20,000. D. A. Fredericks is president of the company.

FAIRPORT, N. Y.—At a special election held in this city Sept. 16, the citizens voted in favor of granting a gas franchise to the Despatch Heat, Light and Power Company.

CINCINNATI, OHIO—A movement to have the new gas rate contract provide for gas extensions to all sections of the city needing the facility was discussed at a meeting of the Board of Governors of the Federated Improvement Associations. Among the suburbs which have been seeking such extensions have been Mt. Washington and the lower river road villages.

DAYTON, OHIO—In order that the people in the outlying sections of Dayton may be properly supplied with gas, the Dayton Gas Company is laying a large feeder just north of the city and extending down Catalpa Drive.

READING, PA.—As a result of an agreement entered into by the Lebanon Gas & Fuel Company to furnish all the gas used by the Annville and Palmyra Gas & Fuel Company, the Lebanon plant will be developed to twice its present capacity. Under the terms of the contract, the Lebanon company is to furnish all the gas consumed at Annville, Palmyra, Hershey and Hummelstown and intermediate points, and the Annville and Palmyra company will abandon operations at Palmyra plant which is now supplying the gas, and will hold it for emergencies.

DALLAS, TEX.—Work has been started on the extension of gas mains to furnish 30,000,000 cu.ft. of natural gas to Dallas Tex.

KENOSHA, WIS.—The Wisconsin Gas & Electric Company is contemplating improvements to plant to a total cost of $250,000.

Financial Notes

THE SPRINGFIELD GAS LIGHT COMPANY reports the following earnings, for the year ended June 30, as compared with the corresponding period of the preceding years:

	1916	1915	1914
Gross	$903,673	$806,163	$780,585
Net	274,257	243,217	218,707
Surplus	60,993	59,239	52,986

THE CITIZENS GAS COMPANY of Indianapolis, in its annual report for the year ending June 30, 1916, shows that the company has accumulated a surplus of $183,030.35, after the payment of $106,236.62 regular dividends, $125,008.57 dividend arrearages, and a reservation of $40,000 for the disputed claim fund.

THE COLUMBIA GAS & ELECTRIC COMPANY has applied to the New York Stock Exchange to list $50,000,000 capital stock.

Current Prices of Public Utility Securities

	Bid	Asked
Adirondack Elec. P.	27	29
Adirondack Elec. P. pf.	83	86
American Gas	120	123
*American Gas & Electric	152	156
*American Gas & Electric pf.	50	51
American Light & Traction	378	382
American Light & Traction pf.	110	112
American Power & Light	70	71
American Power & Light pf.	84	85
American Public Utilities	42	47
American Public Utilities pf.	72	75
American Water W. & Elec.	7¾	8¼
Amer. W. W. & E. 1st pf.	62	65
Amer. W. W. & E. part'g pf.	22	25
Carolina Pow. & Lt.	27	30
Carolina Pow. & Lt. pf.	98	100
Cities Service	318	322
Cities Service pf.	87¾	88¾
Colorado Power	26	27
Colorado Power pf.	99½	101
Commonwealth, Pr. Ry. & Lt.	62	64
Commonwealth, Pr. Ry. & Lt. pf.	84	86
Denver Gas & Electric gen. 5s	96	98
Electric Bond & Share pf.	100	104
Empire District El. pf.	88½	92½
Federal Light & Traction	11	13
Federal Light & Traction pf.	44	48
Gas & Electric Securities	280	300
Gas & Electric Securities pf.	95	100
Northern States Power	99	100
Northern States Power pf.	97	99
North. Ont. Lt. & P.	15	18
North. Ont. Lt. & P. pf.	55	60
Ozark Power & Water	44	48
Pacific Gas & Electric	59	59¼
Pacific Gas & Electric pf.	90	91
Republic Ry. & Light Co.	46	46¾
Republic Ry. & Light Co. pf.	76	78
*Standard Gas & Electric	14½	15½
*Standard Gas & Electric pf.	41	42
So. Cal. Edison	93	94
So. Cal. Edison pf.	106	108
Tennessee Ry., Light & Power	10	11
Tennessee Ry., Light & Power pf.	48	50
Toledo Trac., Light & Power	50	53
Toledo Trac., Light & Power pf.	87½	—
United Light & Railways	49	51
United Light & Railways 1st pf.	74½	76½
Western Power	20	21
Western Power pf.	69½	71

*Par value $50